ORIGINAL ARTICLE:

New vesicovaginal fistula formation in a rabbit model

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ABSTRACT

Objective: To create an animal model of vesicovaginal fistula as a modality to develop therapy.

Material and Methods: This study was an preliminary experimental study to create new fistula vesicovaginal formation in a rabbit model. Six female New Zealand white rabbits of Stem Cell Research and Development Center of Universitas Airlangga were used in this study and were divided into 3 groups in which there were 2 rabbits in each group. Vesicovaginal fistula formation was performed through laparotomy surgery. After the abdomen is opened, the Nasogastric tube is inserted vaginally into the anterior vaginal wall. The incision is made on the anterior vaginal wall and the posterior wall of the bladder. The Nasogastric tube that comes out of the vagina is inserted into the bladder incision to maintain the formation of vesicovaginal fistula. Both mucosal walls are sutured and tested to determine if there is any leak. Evaluation the model of vesicovaginal fistula was carried out 3 weeks postoperatively according the group.

Result: Four out of six rabbits have formed vesicovaginal fistulas, which are from groups two and three. There are no complications during the treatment period until termination

Conclusion: Rabbits have the potential to become experimental animals for the vesicovaginal fistula model. The best time to release a nasogastric tube to maintain a fistula is 2 weeks.

Keywords: vesicovaginal fistula; animal model

ABSTRAK

Tujuan: Untuk membuat model hewan fistula vesikovaginal sebagai modalitas mengembangkan terapi

Bahan dan Metode: Penelitian ini adalah studi eksperimental awal untuk membuat formasi vesikovagina fistula pada model kelinci. Enam kelinci putih New Zealand betina dari Institute of Tropical Diseases Universitas Airlangga digunakan dalam penelitian ini dan dibagi menjadi 3 kelompok di mana terdapat 2 kelinci di masing-masing kelompok. Pembentukan fistula vesikovagina dilakukan melalui operasi laparotomi. Setelah perut kelinci dibuka, tabung nasogastrik dimasukkan melalui vagina sampai tampak pada vagina anterior di dalam abdomen. Sayatan dibuat di dinding vagina anterior dan dinding posterior kandung kemih. Tabung nasogastrik yang keluar dari vagina dimasukkan ke dalam sayatan kandung kemih untuk mempertahankan pembentukan fistula vesikovagina. Kedua dinding mukosa dijahit dan dilakukan tes untuk mengetahui apakah ada kebocoran. Evaluasi model fistula vesikovagina dilakukan 3 minggu pasca operasi sesuai kelompok.

Hasil: Empat dari enam kelinci telah membentuk fistula vesikovaginal, yang berasal dari kelompok dua dan tiga. Tidak didapatkan komplikasi selama periode perawatan sampai terminasi

Simpulan: Kelinci berpotensi menjadi hewan coba untuk model fistula vesikovagina. Waktu terbaik melepaskan tabung nasogastrik untuk mempertahankan fistula adalah 2 minggu

Kata kunci: fistula vesikovaginal, model hewan coba

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INTRODUCTION

Vesicovaginal fistula is still a major cause for concern in many developing countries. It represents a significant morbidity in urogynecology. Continual wetness, odor, and discomfort cause serious social problems.[1] In the developed countries, the most common etiologies of VVF include gynecological surgery injuries, pelvic surgery or radiotherapy lesions, whereas, in developing countries, obstetric causes are the predominant etiology due to prolonged obstructed labor in patients with poor access to medical care.[2,3] The WHO has estimated that about 3 million women have obstetric fistula worldwide, with 50 - 130,000 new fistulas reported each year.[2]

Rates of failure after bladder fistula repairs depend on the type and severity of the fistula, patient complexity, nature and cause of the fistula, and length of follow-up. Surgery is a standard treatment of vesicovaginal fistula which has a success rate of 85-95% in the first surgery and will decrease in recurrent surgery. Vesicovaginal fistula recurrence has been reported within 3 months of repair, with the mean time to failure at 25 days, 41 % of patients who fail have at least one failed prior attempt.[3,4] In Dr. Soetomo Hospital Surabaya found that about 50% of cases of fistula carried out by surgical experienced a recurrence.

It is desirable to be able to know the factors that cause the failure of surgery and new surgical methods for the management of vesicovaginal fistulas. Therefore we need an animal model. The selected animals are smaller, cheaper, and easier to maintain. The aim of this study was to obtain an experimental model of vesicovaginal fistula which was easier to obtain and treat before a study was conducted on the therapy of vesicovaginal fistula.

MATERIALS AND METHODS

This research is experimental study using female New Zealand white rabbits weighing about 3-4 kilograms and conducted at the Stem Cell Research and Development Center of Universitas Airlangga after ethical approval by the Research Ethics Commission of the Faculty of Veterinary Medicine. Rabbits are adapted first for 7 days in a clean, air-conditioned, light with a size of 60x40x40 cm. All rabbits get food in the form of 100g/kgBW/day pellets given in the morning and evening and get enough drinks.

The total number of rabbits needed is 6 rabbits. All rabbits were made to make models of vesicovaginal fistulas first by maintaining a nasogastric tube to form a vesicovaginal fistula. Then the rabbits were divided into three groups, namely the group that maintained the nasogastric pipe for 1 week, 2 weeks, and 3 weeks. Evaluation of fistula formation will be carried out according to the group 3 weeks after the surgery.

Surgery

Rabbit experiments were carried out by anesthesia using Ketamine 40 mg/kgBW and Azepromazine 0.5-1 mg/kgBW intramuscularly.[5] Rabbit hair in the operating area is first shaved. The operation is carried out in a sterile place. Rabbits are placed on the operating table with the supine position. The operating field is cleaned using 70% alcohol and povidone iodine. The operating field is then narrowed down with sterile cloth.

Figure 1. Suturing the bladder and vagina with nasogastric tube to maintain the fistula formation

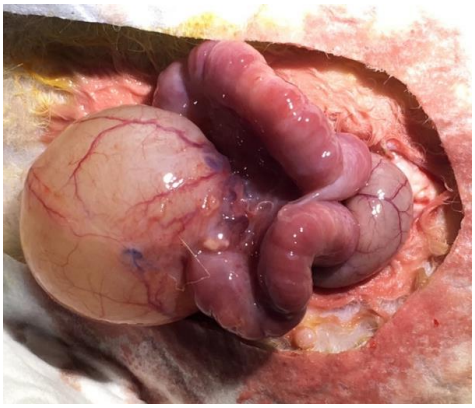

Figure 2. Evaluation 3 weeks after surgery

Laparotomy is performed with a 5 cm vertical incision, using a scalpel no. 10 deepened to open the abdominal cavity. Identification is done to look for bladder and

vaginal. Separate rabbit bladder with vagina removed from the abdomen. The 14 Fr nasogastric tube is inserted through the vaginal opening until it appears prominently on the vaginal wall. This nasogastric tube is used as a marker when making incisions in the vaginal wall. The vaginal wall is then incised according to the nasogastric pipe marker with a diameter of 5 mm. The posterior wall of the bladder is then incised by 5 mm using no 10 scalpels. The nasogastric tube that exits the vaginal hole is then inserted into the hole in the posterior bladder wall, and the mucosa between them was sutured together with 4-0 absorbable sutures (figure 1).

Normal saline fluid is inserted through a nasogastric tube for approximately 20cc using a 20 cc syringe to evaluate leakage in suturing the vaginal wall and bladder. If no leak is obtained, washing the abdominal cavity is done using sterile water and the operating field is closed. The abdominal wall and skin are closed using a 3-0 absorbable suture. The remainder of the nasogastric tube was cut 1 cm from the vaginal introitus, fixed to the lateral vaginal wall using 2-0 non absorbable suture and maintained according to their respective groups, 1 week, 2 weeks, and 3 weeks. Then rabbits were euthanized and incinerated at Institute of Tropical Disease.

Post-surgery management

All rabbits receive the same postoperative care. Each rabbit was given antibiotics Enrofloxacin 10 mg/kgBW twice daily and analgesics phenylbutazone 20 mg/kgBW twice daily.[5,6] Both drugs are given intramuscularly for five days. Bandages in abdominal wounds are replaced every two days and monitored for wound healing. Every day rabbits are monitored for their diet, eye conditions, and urine.

Nasogastric tube release is carried out according to the group, which is 1 week, 2 weeks, and 3 weeks. The time for evaluating the fistula is done after 3 weeks of surgery (figure 2). At the time of the evaluation, the rabbits were again carried out laparotomy as when making a model of vesicovaginal fistula. After the abdominal cavity is opened, an incision in the anterior wall of urinary vesicles is performed and an evaluation of vesicovaginal fistula is performed.

RESULTS AND DISCUSSION

The average body weight of the rabbit was 3.34 kg (3.0-3.8 kg) at the beginning of the study. The average body weight of rabbits at the end of the study was 3.48 kg (3.1-3.9 kg). During the 3 weeks of postoperative treatment, no rabbits were sick or dead. There were no complications obtained after treatment. The wound on the abdominal skin closes perfectly and the rabbit's diet is good.

Table 1. Characteristic formation of vesicovaginal fistula models

Group		Weight day-1 (kg)	Weight Day-21 (kg)	Fistula	Fistula size
1 week	Rabbit.1	3.0	3.2	No	-
	Rabbit.2	3.5	3.4	No	-
2 weeks	Rabbit.3	3.0	3.1	Yes	0,4 cm
	Rabbit.4	3.8	3.8	Yes	0,5 cm
3 weeks	Rabbit.5	3.6	3.9	Yes	0,5 cm
	Rabbit.6	3.3	3.5	Yes	0,5 cm

The results of the evaluation of fistula formation, found in the group that was placed in the nasogastric tube for 1 week, did not find fistulas in both rabbits (figure 3). The wound of making a fistula closes well even though bladder attaches to the vaginal wall. In the second group where the nasogastric tube was maintained for two weeks, fistulas were formed with a diameter of 0.4 cm and 0.5 cm (figure 4). In the third group, in both rabbits a nasogastric tube was found that connected the bladder and vagina. At the end of the nasogastric tube, crusts are attached to the wall of the nasogastric tube and the fistula is still formed with a diameter of 0.5 cm (figure 5).

The study of making models of vesicovaginal fistula in rabbits was carried out previously by Meeks et al (1997) with hysterectomy treatment which then performed vaginal stump suturing using a 2-0 vicryl needle which was passed into bladder. This study showed that the suturing method of vaginal stomp which was passed into bladder did not produce a model of vesicovaginal fistula in rabbits. From the results of the inspection it was found that no fistula was formed and found many complications after hysterectomy such as adhesion with the small intestine and colon.[7]

Linberg conducted research to create a vesicovaginal fistula model with pigs, a technique used with rectal tube inserted into the vagina as a marker for making vaginal and bladder incisions. Pigs are chosen because the pig's anatomy is more similar to humans so that it can be used as a reference if applied to humans.[8]

This research have advantages as easy to obtain, easy to maintain, and cheaper animals, rabbits have a vaginal anatomy that is separate from bladder so it does not need to separate when making models of vesicovaginal fistulas.

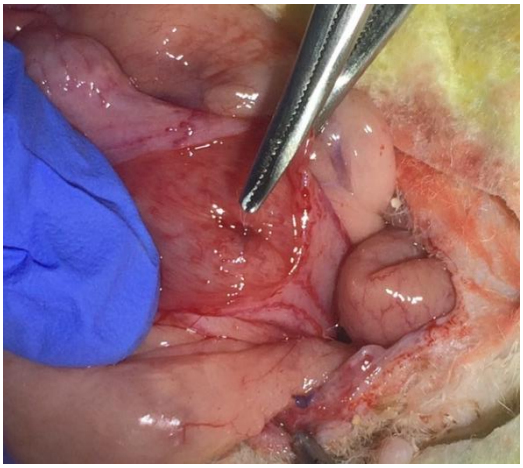

Figure 3. Group 1, with a closed fistula

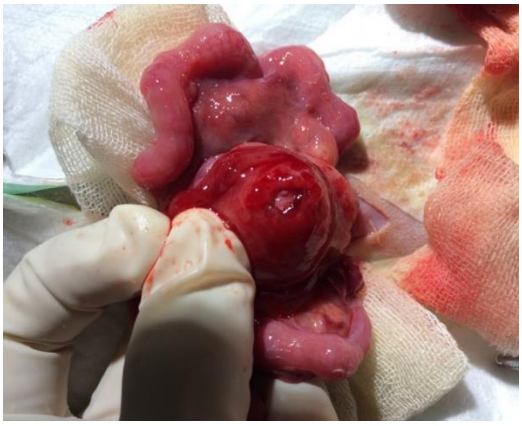

Figure 4. Fistula formed

Figure 5. Fistula formed Group 3, crust formed at the end of NGT

The results of this study indicate that by maintaining a nasogastric tube for 1 week and evaluation for 3 weeks, the formed fistula has closed again. This can be caused by the spontaneous wound healing process in the fistula. On the seventh day the process of healing rabbit wounds is still entering the stage of proliferation. Abramov said that the reepithelialization of the rabbit's vaginal wounds was perfect for the 14th day.[9] This proves that in rabbits the nasogastric pipe is maintained for 2 weeks and left for 1 week, the fistula has been formed.

In rabbits where the nasogastric tube is maintained for 3 weeks, a clear fistula will form, because the fistula hole has been maintained continuously by the nasogastric tube, but the weakness of this model rabbit is that there is a crust that surrounds the nasogastric tube and can make urolithiasis. Urolithiasis is characterized by solitary or multiple calculi found anywhere throughout the urinary tract or by the presence of sandy material within the bladder and urethra.[5]

CONCLUSION

Rabbits have the potential to become experimental animals for the vesicovaginal fistula model. The incisions in the vagina and bladder are stitched together and the fistula is maintained with a nasogastric tube. The best time to maintain a fistula is 2 weeks

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